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Global Care through Ayurveda in Pandemic of COVID -19

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ABSTRACT

When the whole world is facing this pandemic and till date there is no specific treatment is available to prevent the mitigate SARS-COV-2 as admitted by WHO. Ayurveda has been practiced in India for over 5000 years and is recognized as a complete medical system. Due to increased global travel and rapid urbanization, epidemic outbreaks caused by emerging and re-emerging viruses represent a critical threat to public health, particularly when preventive vaccines and antiviral therapies are unavailable. Viruses are responsible for several human pathogens including COVID -19. The CoV family consists of several species and causes upper respiratory tract and gastrointestinal infections in mammals and birds. Herbal medicines and mineral products provide a rich resource for novel antiviral drug development. Identification of the antiviral mechanisms from these natural agents has shed light on where they interact with the viral life cycle, such as viral entry, replication, assembly, and release, as well as on the targeting of virus-host-specific interactions. In the wake of COVID 19, an infectious disease caused by a newly discovered coronavirus, entire mankind across the globe is suffering. Till date, there is no medicine to cure or a vaccine to prevent this infection. The best ways of preventing COVID19 infection are breaking the chain, enhancing an individual's body immunity, identifying the infection early and timely medical care.

***Key words*: -** SARS-COV-2, COVID-19, Herbal Medicine, Pandemic, Ayurveda, Coronavirus.

1. INTRODUCTION

The COVID-19 pandemic is defining the global health crisis of our time and occurs to be the greatest challenge we have faced since the second World War. The number of deaths and people getting infected cases are rising daily throughout the world**.** Ayurveda has been practiced in India for over 5000 years and is recognized as a complete medical system. Due to increased global travel and rapid urbanization, epidemic outbreaks caused by emerging and re-emerging viruses represent a critical threat to public health, particularly when preventive vaccines and antiviral therapies are unavailable. Viruses are responsible for several human pathogens including COVID -19. Viral infections play an important role in human diseases, and recent outbreaks in the advent of globalization and ease of travel have underscored their prevention as a critical issue in safeguarding public health. Hence, there is an urgent need to discover novel antivirals that are highly efficacious and cost-effective for the management and control of viral infections when vaccines and standard therapies are lacking.

2. **Basic Concept of Ayurveda in the pandemic COVID -19: -** Ayurveda documented epidemics/pandemics under the context of *Janapadodhvamsa* (conditions devastate the human settlements). Similarly, infectious diseases have been considered under *Sankramika rogas.* Pollution of air, water, climate, and environment is

responsible for the spread of diseases on such a large scale resulting in *Janapadodhvamsa*. Causes of vitiation of air, water, climate and place along with their characteristics have been enumerated in classics[1]. Improper disposal of waste, distribution of polluted water, air pollution, indulgence in unhealthy and unwholesome activities, failure of judgment and misunderstanding of situation etc. also result in reasonable damage to the health of the society; ultimately leading to *Janapadodhwamsa*. Such conditions will manifest in symptoms like cough, breathlessness, fever etc. In Ayurveda, initial phases of the manifestation can be comparable to *Agantuja Vata Kaphaja Jwara*. Uncontrolled conditions further vitiate other *Doshaas* and another *Rasa, Rakta, Mamsadi dushyas* thus entering *Sannipataja* condition[2].

3. **Introduction of COVID-19**: - CORONA virus CoV is an enveloped, positive-sense single-stranded RNA (ss-RNA) virus belonging to the *Coronaviridae* family. In humans, it mainly causes common cold, but complications including pneumonia and SARS can occur[3].

4. **Reasons for the Current Interest in Ayurveda**: - Whereas conventional medicine is primarily oriented toward the treatment of disease, Ayurvedic medicine is oriented toward prevention, health maintenance, and treatment. In conventional medicine, drugs are developed based on the concept that the elimination of specific causes of a disease, such as microorganisms, will cure a disease. On the other hand, the belief in Ayurvedic medicine is that a disease is the product of an imbalance in the body and mental elements that reduce the body's resistance to diseases. If the imbalance is corrected and the body's defense mechanisms are strengthened by herbal formulas, lifestyle changes, and diet, then the body will resist a disease with a goal of eliminating it. Herbal and Herbo-mineral products regularly used in Ayurveda are believed to strengthen the body's defense. Ayurvedic formulas are time tested for safety. These formulas contain vitamins; minerals; biologically active steroids, alkaloids, glycosides, and tannins; and a variety of antioxidants in a natural state.

5. Concept of *'Vyadhirodhak Chamatav'* in Ayurveda

The concept of "*Vyadhirodhak chamatav*" i.e. capacity of the body to resist disease. Obviously, the immune system, as recognised in modern biology, which provides protection against microbes, should be a part of it. An entire section of the Materia Medica of Ayurveda termed *'Rasayanas'* is devoted to enhancement of body's resistance. *Rasayana* include not only drugs (*'Aushadhi'*) but also *"Aachar"* (daily routine including exercise), "*Aahar"* (diet and nutrition) and "*Vyavhar"* (mental attitude and discipline) which are equally important in achieving the desired goal. [4]

6. *Rasayana* therapy

It promotes and rejuvenate the physiology of body, produce resistance against disease both physically and mentally. *Rasayana* is made up of two words: *Rasa* and *Ayana*. *Rasa* primarily means essential seven vital tissues (*Saptdhatu* e.g. *Rasa, Rakta, Mansa, Meda, Asthi, Majja and Shukra*). *Ayana* means the path or channel. So, *Rasayanas* are those that bring about proper uptake, growth, and improvement of essential *Saptadhatus* (seven vital tissues)[5]. According to *Acharya Charaka*, use of *Rasayanas* results in *Dirghamaayu*[6] (disease-free long life), *Smiriti*[6] (recapitulating power), *Medha, Aarogyam*[6] (healthy wellbeing), *Tarun vaya* (youthfulness), *Prabha, Varna* (complexion), voice, strength etc[6] According to *Acharya Sarangdhara*, various drugs, diet and regimens which promote

longevity by delaying aging (*Jaranashanam*) and preventing diseases (*Vyadhinashnum*) are called *Rasayana* [7]*Rasayana* is a specialised treatment influencing the fundamental aspects of the organs i.e. *Dhatus, Agni* and *Srotamsi,* leading to overall improvement in the organism, which affords prevention of ageing, resistance against diseases, bodily strength and improvement in mental faculties.

7. Role of *Swarna* as immunomodulator

7.1 Immunomodulatory activity

In an experimental study to evaluate the efficacy of *Swarna Bhasma* on non-specific immunity, male mice were given *Swarna Bhasma* orally in incremental dose for 10 days. It was found that *Swarna Bhasma* significantly ($p<0.001$) increased peritoneal macrophages count and stimulated phagocytic index of macrophages[8]

7.2 Free radical scavenging activity

In an experimental study on chronic *Swarna Bhasma* treated animals, it was found that there was significant increase in superoxide dismutase and catalase activity in those animals, as these two enzymes lessen the free radical concentration in body. Antioxidant or curative effects of *Swarna Bhasma* has also been reported against global and focal models of stroke**[8]**

7.3 Analgesic activity

In an experimental study four types of stimuli (chemical, electrical, thermal, and mechanical) were used to investigate analgesic effects of *swarna* in rats and mice[9].

7.4 Anti-stress effect of *swarna*

In a research to investigate therapeutic potential of *Swarna bhasma* in restrain induced stress at different time points of 01 hour, 02 hours and 04 hours using experimental rat model. Prior to restrain stress Rats were pre-treated with *Swarna Bhasma* in a dose of 25 mg/kg orally for 10 days. Levels of Brain catecholamine, serotonin and plasma corticosterone were determined following 01, 02 and 04 hours restraint stress by using HPLC and luminescence spectrophotometry. It was found that there was significant restoration of altered levels of brain catecholamines (norepinephrine, epinephrine, and dopamine), 5 HT and plasma corticosterone to near normal levels in restrain stress induced rats**[10]**.

7.5 Toxicological studies

In an experimental study on *Swarna bhasma*, it was found that the acute oral administration of *Swarna Bhasma* showed no mortality in mice (up to 1 ml/20 g body weight of *Swarna Bhasma* suspension containing 01 mg of drug). Also, no toxicity was seen on chronic administration of Swarna Bhasma **[11,12].**

8. Natural Herbal Immunomodulator

8.1 Piper longum (‘**Pipalli**’ **Piperaceae)**

Alcoholic extract of the fruits of the plant Piper longum and its component piperine was studied for their immunomodulatory and antitumor activity. Bone marrow cellularity and alphaesterase positive cells were also increased by the administration of Piper longum extract and piperine**[13]**. Immunomodulatory activity of Piper longum, Piperine may be due to the combined action of humoral and cell mediated immune responses. One of the major objectives of the immunotherapy is to modulate immune responses for selected objectives. It includes augmentation of cell mediated immunity and cytotoxic effect. Piper longum and piperine also stimulate the stem cell proliferation and differenation**[14]** While it is known to act as an anti-mutagenic and anti-tumour agent, anti-diarrheic and anti-dysenteric properties of this spice enhance its medicinal value. The pharmacological properties of this plant also include antioxidant, anti-inflammatory, hepatoprotective, immunomodulatory, anti-microbial, antiplatelet, anti-hyperlipidaemic, analgesic,anti-depressant, anti-amoebic,

anti-obesity, radioprotective, cardio protective and anti-fungal effect[15].

8.2 Glycyrrhiza glabra (‘**Mulethi’ Fabaceae)**

Potential uses of Glycyrrhiza glabra for anti-tumour, anti- microbial, antiviral, anti-inflammatory, immune regulatory and several other activities that contribute to the recovery and protection of the nervous, alimentary, respiratory, endocrine, and cardiovascular systems[16]. Glycyrrhizin, a triterpene glycoside from root of Glycyrrhiza glabra, has positive effects on inhibition of hepatic apoptosis and necrosis by suppression of TNF-α and caspase-3, an important cytokine[17]. Recently, researchers have the antibacterial activity of root and leaf extract of Glycyrrhiza glabra against E.coli, Pseudomonas aeruginosa, Enterobacter cloacae and Klebsiella sp. using well and disc method showing that both extracts were ineffective against Enterobacter cloacae and Klebsiella sp. while strong antibacterial activity against E. coli and Pseudomonas aeruginosa. Therefore, Glycyrrhiza glabra might be useful in the treatment of diarrhoea caused by rotavirus infection[18]. High phenolic content compounds present in Glycyrrhiza glabra Linn. is responsible for its strong antioxidant activity due to free radical scavenging[19].

8.3 Emblica officinalis ('amla'- Euphorbiaceae)

Phyllanthus emblica (also known as Emblica officinalis) is one of the major constituents of many Ayurvedic tonics prescribed for rejuvenation, recuperation, and vitality[20].It is also an excellent source of vitamin C[21]. Research shows the immunomodulatory effect of P. emblica on immune profile of tumour bearing mice. When administered orally, P. emblica fruit powder was found to enhance NK cell activity and antibody dependent cellular cytotoxicity (ADCC) in syngeneic Balb/c mice bearing Dalton's lymphoma ascites tumour.

Ellagic acid, as a powerful antioxidant present in Emblica officinalis can inhibit mutation in gene and repair the chromosomal abnormality[22]. It has potent free radical scavenging agents, immunomodulating and cyto-protective effect. Immunomodulatory activity by humoral antibody formation and establishment of cell-mediated immunity. Different biological activities of Emblica Officinalis include antioxidant, immunomodulatory, anticancer, cytoprotective, analgesic, antimicrobial, antipyretic, antitussive and hepatoprotective effect. Majorities of the diseases are chiefly due to the imbalance between pro-oxidant and antioxidant homeostatic phenomenon in the body, and the Emblica officinalis balances this because of its antioxidant activity. It also reduces the side effects of chemotherapy and radiotherapy [23].

8.4 Curcuma longa ('Haldi' - Zingiberaceae)

C. longa rhizome (turmeric), commonly used as spice, is well known for its medicinal value in the Indian traditional system of medicine. Both the crude extract and active principle of this plant have been investigated for Anti-inflammatory, anti-tumour and immunomodulatory activities[24] Curcumin (diferuloylmethane), which gives yellow colour to turmeric rhizome, is one of the active ingredients responsible for the biological activity. It has been shown to possess anti-inflammatory effect in acute, subacute as well as chronic models of inflammation, in mice and rats. However, the effect is weaker than phenylbutazone. Dietary curcumin enhances IgG levels. Curcuminoids are considered as key active constituents of Curcuma longa and are reported to possess several biological activities. Numerous lines of evidence suggested, that curcuminoids are potent anti-inflammatory agents working through multiple mechanisms viz., suppression of the activation of nuclear factor (NF)-kappa B, inhibition of cyclooxygenase (COX)-2, down-regulation of the expression of cell

proliferation, anti-apoptotic, and metastatic gene products[25] Curcuminoids have also been demonstrated to modulate the proliferation and cellular response of various immune cell types, such as T cells, B cells, macrophages, neutrophils, natural killer NK cells and dendritic cells[26].

8.5 Asparagus racemosus ('Shatavari' Asparagaceae)

Asparagus racemosus is a well-known Ayurvedic *Rasayana* which prevents ageing, increase longevity, impart immunity, improve mental function, Vigour and add vitality to the body and it is also used in nervous disorders, dyspepsia, tumours, inflammation, neuropathy, hepatopathy. Reports indicate that the pharmacological activities of Asparagus racemosus root extract include antiulcer, antioxidant, and antidiarrheal, antidiabetic and immunomodulatory activities. Root of A. racemosus has been referred as bitter-sweet, emollient, cooling, nervine tonic, constipating, galactagogue, and aphrodisiac, diuretic, rejuvenating, carminative, stomachic, antiseptic, and as tonic. Beneficial effects of the root of Asparagus recemosus are suggested in nervous disorders, dyspepsia, diarrhoea, dysentery, tumours, inflammations, neuropathy, hepatopathy, cough, bronchitis, hyperacidity and certain infectious diseases[27].

8.6 Allium sativum ('Lasun' Liliaceae)

Organosulfur compounds of *garlic* have been shown to inhibit growth of tumors in animals and to modulate activity of diverse chemical carcinogens[28-30]This effect may be related to activation of natural killer (NK) cells, stimulation of T-lymphocytes and enhanced production of IL-2[31]

8.7 Azadirachta indica ('neem'-Meliaceae)

A. indica is one of the most common wild growing trees in India. Research studies have shown that it possesses significant non-specific immunostimulatory properties[32]. This type of response has been implicated to be protective in nature, the therapeutic effects of *neem*, as reported in the traditional medicine, may be mediated by activation of cellular immune responses. Research evaluated the effects of A. indica leaf extract administration on humoral and cell mediated responses in ovalbumin immunized mice. Treated mice (100 mg/Kg) had higher IgM, IgG, and anti-ovalbumin antibody titers compared with controls. There was also enhancement of macrophage migration inhibition and foot pad thickness[33].

8.8 Tinospora cordifolia, ('giloe'-Menispermaceae)

T. cordifolia is a traditional Indian medicinal plant that have multiple medicinal properties (anti-bacterial, anti-allergic, antidiabetic, analgesic and diuretic). It has also been used as tonic and vitaliser to enhance body's natural resistance. However, the mechanisms by which it act remains to be elucidated. Extract of T. cordifolia was tested for anticancer activitv[34] in this study examined the effect of crude extract (water extract) of dry Stem of T. cordifolia and T. malabarica on lymphocyte proliferation[35]. Study demonstrated immunotherapeutic potential of T. cordifolia against abdominal sepsis induced by caecal ligation in rats[36].

8.9 Withania somnifera ('Ashwagandha'Solanaceae)

W. somnifera. is used in several Ayurvedic drug preparations. Several withanolides isolated from this plant have been reported in literature to possess both immunosuppressive and immunostimulatory properties. Extract of W. somnifera was tested for anticancer activity.[34] Administration of a 75% methanolic extract of the plant was found to significantly increase total WBC count in normal Balb/c mice and in mice with leucopenia induced by sublethal dose of gamma irradiation.[37] A significant modulation of immune reactivity by *Ashwagandha* was observed in an animal model of myelosuppression induced by

cyclophosphamide, azathioprin and prednisolone.

Ashwagandha prevented myelosuppression in mice treated with all three immunosuppressive drugs. Treatment with *Ashwagandha* was accompanied with significant increase in haemolytic antibody responses towards human erythrocytes[38]. The effect of *Ashwagandha* on the function of macrophages obtained from mice treated with ochratoxin A has been investigated. Treatment with Ashwagandha significantly inhibited ochratoxin A induced suppression of chemotactic activity and production of IL-I and TNF-a by macrophages.[39]

9. Classical Herbo-mineral forumlations for management of COVID-19

S.No	Name of formulation	Reference
1.	*Shwas Kuthar Rasa*	*Yoga Ratnakara, Shwasa Chikitsa, pg 373*
2.	*Swarnamalini vasanta rasa*	*Siddha Bheshaja Manimala, Jwaraprakarana, 60-62*
3.	*Tribhuvana kirti rasa*	*Yogaratnakara, Jwarachikitsa, pg 241*
4.	*Vasanta Kusumakara Rasa*	*Rasendra Sara Samgraha, Rasayana Vajikarana*
		Adhikara, 80-85
5.	*Vishamajwarantaka lauha*	*Rasendra Sara Sangraha, Jwaradhikara, 271-277*
6.	*Sameerapannaga rasa*	*Ayurveda Aushadhiguna Dharma Shastra, Part IV, pg*
		88
7.	*Navajeevana Rasa*	*Ayurveda Sara Samgraha, Rasa Rasayana Prakarana,*
		Chapter 5, pg 382
8.	*Mrityunjaya rasa*	*Bhaishajya ratnavali, Jwaradhikara, 409 – 418*
9.	*Mallasindhoora*	*Siddha Bheshaja Manimala 5/37*
10.	*Laxmivilasa rasa*	*Bhaishajya Ratnavali, Rasayanadhikara, 55-68*
11.	*Gorochanadi Vati*	*Vaidya Yoga ratnavali, Gutika Prakarana, 77*
12.	*Chandraprabha Vati*	*Sharangdhara Samhita Madhyama Khand, 7/40-49*
13.	*Bramha Rasayana*	*Ashtang Hridayam, Uttarasthana, 39/15-23*
14.	*Agastya Haritaki Rasayana*	*Ashtanga Hridaya, Chiktsasthana, 3/125-130*
15.	*Achintya Shakti Rasa*	*Ayurveda Sara Sangrahaya*

10. Conclusion: -

From the above review it should be evident that there are several Indian medicinal plants which possess immunomodulatory properties. Natural products serve as an excellent source of biodiversity for discovering novel antivirals and developing effective protective/therapeutic strategies against viral infection. We believe that natural products will continue to play an important role and contribute to antiviral drug development. The best ways of preventing COVID19 infection are breaking the chain, enhancing an individual's body immunity, identifying the infection early and timely medical care. Herbal medicines and mineral products provide a rich resource for novel antiviral drug development. Identification of the antiviral mechanisms from these natural agents has shed light on where they interact with the viral life cycle, such as viral entry, replication, assembly, and release, as well as on the targeting of virus–host-specific interactions.

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